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Leçons de Géographie Physique. Par A. de Lapparent. Paris, Masson & Co. 3d edition, 1907.

The principal merits of Lapparent's great textbook, the lucid presentation of systematical physical geography, and the geomorphogenic description of the continents and countries, are the same in this edition as in the two previous ones. The book has been revised and enlarged along various lines, principally in the chapters on glacial phenomena. The geological descriptions of the Alps and Pyrenees have been entirely re-written in accordance with the results of modern researches. The number of illustrations, too, has been enlarged, most of the new additions being photographs illustrating typical forms of relief. A most valuable innovation is the addition of an alphabetical index which will greatly increase the usefulness of the book. In all other respects the work has preserved the qualities that have made it one of the standard works in its line from the day of its first publication, one of the books which, in the phrase of the book agent, geographers of any nationality "cannot afford to be without." M. K. G.

Desert Botanical Laboratory of the Carnegie Institution. By F. Coville and D. T. MacDougal. vi and 58 pp. Carnegie Institution, Washington, D. C. 1903. Price, 50c.

This laboratory was established at the suggestion of Mr. F. V. Coville, of the United States Department of Agriculture, who made an expedition to Death Valley in 1891 and saw the importance of the botanical problems offered by such regions. A journey was undertaken in the winter of 1903 for the purpose of finding a favourable location. Tucson, Arizona, was finally selected, for its distinctively desert climate and flora, the latter being of a varied character. Accessibility and habitability were also important conditions. These advantages are set forth somewhat fully and a historical account of Tucson is added. There are about 30 full-page plates, and in conclusion is a bibliography comprising eleven pages of titles in four groups—general treatises and those relating to climate, soil and water. Descriptive notes of several regions are given, but these are republished in a later and more complete volume, "Botanical Features of North American Deserts," which is noticed below. A. P. B.

Botanical Features of North American Deserts. By Daniel Trembly MacDougal. 111 pp., Maps and Illustrations. Carnegie Institution, Washington, 1908. Price, $1.75.

This study is the outcome of researches of the Desert Botanical Laboratory, by various authors, under the direction of an advisory board, and with Dr. W. A. Cannon as resident investigator. A first attempt to outline the features of American deserts was made in a previous publication, No. 6, which having been exhausted, some parts of it are included in this later and more complete discussion.

The work deals primarily with plant distribution and plant physiology, especially in relation to moisture, but this notice will seek to present features of general geographic interest. The Laboratory now has title to 860 acres of land for its experiments and observations. One of the most important areas for study is the delta of the Colorado, because of the arid climate and because the Salton and Pattie basins, with their occasional bodies of water, offer conditions similar to those which many regions of American desert have experienced during recent geological periods. Such regions have a highly specialized flora whose origin and distribution are sought to be ascertained.

Nearly half the volume is occupied with descriptive notes on various desert regions. There is an account of conditions seen in the transition from the well-watered districts of eastern Texas to the Chihuahua desert in the western part of that State, including Orange, Houston, San Antonio, Haywood and El Paso, the last point being 939 miles west of Orange and having but 10 inches of precipitation. The Otero basin is next described, which extends northward from El Paso and which offered one of the dangerous routes of travel in early days. It is now known, however, that water is to be found not far below the surface. The deposits of the basin, often saline, were made in the bottom of an ancient lake 2,000 square miles in area. A tract of 300 miles is now covered with the "white sands," which form dunes of comminuted gypsum, rising to heights of 60 feet. Columns of this material, protected by the branches, leaves, and roots of a species of sumac, are sometimes formed through the removal of the surrounding sands by the winds. It was found that the passage of a migrating dune over a surface left infiltrations which changed the soil and led to occupation by a different series of plants from that before present. In the desert hills west of Torres, one of the investigators saw a Papazo Indian bruise the interior tissues of a barrel cactus and extract two or three quarts of not unpalatable liquid which the native uses for drink and for mixing his meal.

A visit is chronicled (1906) to Tehuacan in southern Mexico. The purpose was to study species having storage organs. The region consists of valleys lying between abrupt limestone hills on the eastern side of the continental divide. In the valley of the Rio Salada extensive tunnels have been made by hand work for conducting irrigation waters from the strata of the valley sides. The ditches are constantly raised by deposits of lime and the fields receive lime deposits so largely that they have often been abandoned as useless. Extreme localization of floral colonies is observed here where groups are limited to a few yards of ground or to single slopes and crests. So much calcium is taken up into the pith of some of the cacti that it was gritty when chewed and so crisp as to make it difficult to express the juice. No other region, however, is on record as exhibiting the storage function so extensively as this. There are references to Oaxaca, the ruins of Mitla and the famous ancient cypresses of El Tule. At Mitla was seen the process of making mescal, "a true whiskey of a desert people," from the core of the agave.

Other regions briefly described are the Cucopa Mountains and the sagebrush deserts of the Great Basin; Death Valley; the Grand Cañon of the Colorado River; the delta of the Colorado and the Sonoran desert. In the Great Basin, succulents and storage structures were generally absent in the more northern parts and at elevations above 3,000 feet, liability to freezing being the probable reason. In the account of the Colorado delta it is asserted that contrary to persisent belief, the moist delta region has no effect on neighbouring arid districts, the relative humidity being often as low as 17 per cent. within 50 feet of the river's edge.

There is a folding sketch map of the Colorado delta, including the upper part of the Gulf of California to the southward and the Salton Sea on the north. The bottom of the latter had fortunately been examined botanically in 1903 and an expedition from the Laboratory has circumnavigated the new lake and selected stations for observing the behaviour of vegetation as the evaporating waters recede from the present shorelines. In like manner, study will be given to fringing zones of vegetation about the Pattie Basin.

A geological sketch of the Tucson region by Professor Wm. P. Blake, makes up nearly one-fourth of the text of the volume. Further topics are: the vegetation about Tucson; the temperature, water and soil relations of plants; conditions contributory to deserts; meteorology; soil; formation and extent of deserts and the influence of deserts on life. A folding map shows the chief deserts of the world and two maps in the text exhibit the conceptions of American deserts current in 1835 and 1859. The typical features of deserts are stated as inadequate rainfall, with undeveloped drainage, active wind erosion, great daily temperature range, low relative humidity, soils nearly free from humus and xerophytic vegetation. The ratio between rainfall and evaporation, rather than the absolute amount of either, determines the desert.

It is observed that gradual modifications through a long series have been shown by the study of animals but not of plants, which secure new adaptations rather by sports and saltatory derivatives. The volume closes with interesting observations on desert travel, particularly in reference to the obtaining and use of water and of the juices of desert plants. A. P. B.

The Relation of Desert Plants to Soil Moisture and to Evaporation. By Burton Edward Livingston. 78 pp., Diagrams, Tables, and Bibliography. The Carnegie Institution, Washington, D. C. 1906. Price, 40 cents.

The object of this monograph is the better understanding of the mode of existence of plants which thrive at the extreme limits possible to such organisms. As Alpine plants live under difficult conditions of temperature, so desert plants must survive a high degree of dryness. It is believed that basal principles in the life of plants may be more surely reached in such fields than by studies of growth in a normal environment. The researches embodied in this paper were begun at the Desert Laboratory in 1904 and completed later at the University of Chicago. The data are presented under the general division of "soil studies," "atmospheric studies" and "plant studies," and chiefly relate to conditions found adjacent to the Laboratory.

It was ascertained that the deeper layers of soil contained even at the end of the spring dry season a considerable amount of water. The real surface of evaporation lies below the surface of the ground and the moisture finds protection, since the top layers serve as a dust mulch. Certain species, after germinating, elongate the primary root rapidly and while this is going on the aërial part of the plant makes little growth. While desert plants adapt themselves somewhat to dry soils, this is not deemed "of prime importance." The physical relation of soils and water is discussed under the heads of permeability, rate of downward movement, retaining power, power of soil to raise water from lower levels and the resistance offered by the soil to water absorption by roots. Under "plant studies" we find treated,—water requirement for germination, transpiration of desert plants with numerous graphic illustrations, water requirement of certain plants, and osmotic pressure of cactus juices. The bibliography at the close of the paper includes 32 titles. A. P. B.